

CLAIMS

1. A fan unit comprising:

an electric rotary machine having a rotor and a control
5 circuit for the rotor, said control circuit selectively switching
the normal rotation and the reverse rotation of the rotor; and
a fin structure unified with the rotor.

2. The fan unit according to claim 1, further comprising
a rotation mechanism for rotating the rotor,

10 wherein

the rotor is formed to have an opening at a central portion
thereof in a direction along which the opening permits fluid
to flow and

the fin structure is coupled with a peripheral portion
15 of the opening so as to be unified with the rotor, the peripheral
portion incorporating the rotation mechanism therein.

3. The fan unit according to either claim 1 or 2, wherein
the electric rotary machine is provided with a first magnetic
member, a second magnetic member disposed to face the first
20 magnetic member with a space therebetween, a third magnetic
member disposed between the first and the second magnetic members
and configured to be relatively movable to both the first and second
magnetic members in a predetermined direction in the space,

wherein each of the first and second magnetic members has
25 a plurality of electromagnetic coils which are current-excitable
and disposed in order along each magnetic member so as to have
relative differences in disposal pitches of both of the
electromagnetic coils of the first magnetic members and the
electromagnetic coils of the second magnetic member, and

30 the third magnetic member has a plurality of permanent
magnets magnetized to predetermined magnetic poles and disposed

in order along the third magnetic member, the third magnetic member being unified with the fin structure so as to serve as the rotor.

4. The fan unit according to claim 3, further comprising
5 exciting circuit means configured to supply excitation current to the electromagnetic coils of at least one of the first and second magnetic members.

5. The fan unit according to claim 4, wherein the exciting
10 circuit means is configured to supply the excitation current to the electromagnetic coils of the first and second magnetic members, the excitation current being set to give the same magnet pole to the electromagnetic coils of each of the first and second magnetic members.

6. The fan unit according to claim 5, wherein the
15 excitation current supplied to the electromagnetic coils of the first magnetic member is different in phase from the excitation current supplied to the electromagnetic coils of the second magnetic member.

7. The fan unit according to any one of claims 2 to 6,
20 wherein the fan unit according to claim 5, wherein each of the first, second and third magnetic members is formed into a circular arch shape.

8. The fan unit according to any one of claims 2 to 7,
wherein both of the first and second magnetic members are disposed
25 with an equal spatial distance kept therebetween and the third magnetic member is located at a central position between first and second magnetic members.

9. The fan unit according to claim 2, wherein the fan structure is formed to have a hole at a center of the fan structure.

10. The fan unit according to claim 1, further comprising a support device rotatably supporting the rotor, the support device being disposed at a rotational center of the rotor.

5 11. The fan unit according to claim 1, further comprising a support device rotatably supporting the rotor, the support device being disposed around a peripheral portion of the rotor.

12. The fan unit according to claim 1, wherein the electric rotary machine is an electric motor.

10 13. The fan unit according to claim 1, wherein the electric rotary machine is an electric generator.

14. A heat exchange system having a compressor for a heat exchange medium, the compressor including the fan unit according to any one of claims 1 - 12.

AMENDED CLAIMS

[received by the International Bureau on 28 February 2005 (28.02.05)
original claim 1 amended; original claims 15-20 added]

1. (Amended) A fan unit comprising:
an electric rotary machine having a rotor and a control circuit for the rotor, said control circuit selectively switching the normal rotation and the reverse rotation of the rotor; and
a fin structure unified with the rotor,
wherein said rotor has a structure of being encircled by coils.
2. The fan unit according to claim 1, further comprising a rotation mechanism for rotating the rotor,
wherein
the rotor is formed to have an opening at a central portion thereof in a direction along which the opening permits fluid to flow and
the fin structure is coupled with a peripheral portion of the opening so as to be unified with the rotor, the peripheral portion incorporating the rotation mechanism therein.
3. The fan unit according to either claim 1 or 2, wherein the electric rotary machine is provided with a first magnetic member, a second magnetic member disposed to face the first magnetic member with a space therebetween, a third magnetic member disposed between the first and the second magnetic members and configured to be relatively movable to both the first and second magnetic members in a predetermined direction in the space,

wherein each of the first and second magnetic members has a plurality of electromagnetic coils which are current-excitable and disposed in order along each magnetic member so as to have relative differences in disposal pitches of both of the electromagnetic coils of the first magnetic members and the electromagnetic coils of the second magnetic member, and

the third magnetic member has a plurality of permanent magnets magnetized to predetermined magnetic poles and disposed in order along the third magnetic member, the third magnetic member being unified with the fin structure so as to serve as the rotor.

4. The fan unit according to claim 3, further comprising exciting circuit means configured to supply excitation current to the electromagnetic coils of at least one of the first and second magnetic members.

5. The fan unit according to claim 4, wherein the exciting circuit means is configured to supply the excitation current to the electromagnetic coils of the first and second magnetic members, the excitation current being set to give the same magnet pole to the electromagnetic coils of each of the first and second magnetic members.

6. The fan unit according to claim 5, wherein the excitation current supplied to the electromagnetic coils of the first magnetic member is different in phase from the excitation current supplied to the electromagnetic coils of the second magnetic member.

7. The fan unit according to any one of claims 2 to 6, wherein the fan unit according to claim 5, wherein each of the first, second and third magnetic members is formed into a circular arch shape.

8. The fan unit according to any one of claims 2 to 7, wherein both of the first and second magnetic members are disposed with an equal spatial distance kept therebetween and the third magnetic member is located at a central position between first and second magnetic members.

9. The fan unit according to claim 2, wherein the fan structure is formed to have a hole at a center of the fan structure.

10. The fan unit according to claim 1, further comprising a support device rotatably supporting the rotor, the support device being disposed at a rotational center of the rotor.

11. The fan unit according to claim 1, further comprising a support device rotatably supporting the rotor, the support device being disposed around a peripheral portion of the rotor.

12. The fan unit according to claim 1, wherein the electric rotary machine is an electric motor.

13. The fan unit according to claim 1, wherein the electric rotary machine is an electric generator.

14. A heat exchange system having a compressor for a heat exchange medium, the compressor including the fan unit according to any one of claims 1 – 12.

15.(New) A fan unit comprising:

an electric rotary machine having a rotor and a control circuit for the rotor, said control circuit selectively switching the normal rotation and the reverse rotation of the rotor; and

a fin structure unified with the rotor,

wherein the electric rotary machine is provided with a first magnetic member, a second magnetic member disposed to face the first magnetic member with a space therebetween, a third magnetic member disposed between the first and the second magnetic members and configured to relatively movable to both the first and second magnetic members in a predetermined direction in the space;

and wherein, each of the first and second magnetic members has a plurality of electromagnetic coils which are current-excitable and disposed in order along each magnetic member so as to have relative differences in disposal pitches of both of the electromagnetic coils of the first magnetic members and the electromagnetic coils of the second magnetic member; and

the third magnetic member has a plurality of permanent magnets magnetized to predetermined magnetic poles and disposed in order along the third magnetic member, the third magnetic member being unified with the fin structure so as to serve as the rotor.

16. (New). The fan unit according to claim 15 further comprising exciting circuit means configured to supply excitation current to the electromagnetic coils of at least one of the first and second magnetic members.

17. (New) The fan unit according to claim 16, wherein the exciting circuit means is configured to supply the excitation current to the electromagnetic coils of the first and second magnetic members, the excitation current being set to give the same magnet pole to the electromagnetic coils of each of the first and second magnetic members.

18. (New) The fan unit according to claim 17, wherein the excitation current supplied to the electromagnetic coils of the first magnetic member is different in phase from the excitation current supplied to the electromagnetic coils of the second magnetic member.

19. (New) The fan unit according to any one of claims 15 to 18, wherein the fan unit according to claim 5, wherein each of the first, second and third magnetic members is formed into a circular arch shape.

20. (New) The fan unit according to any one of claims 15 to 19, wherein both of the first and second magnetic members are disposed with an equal spatial distance kept therebetween and the third magnetic member is located at a central position between first and second magnetic members.